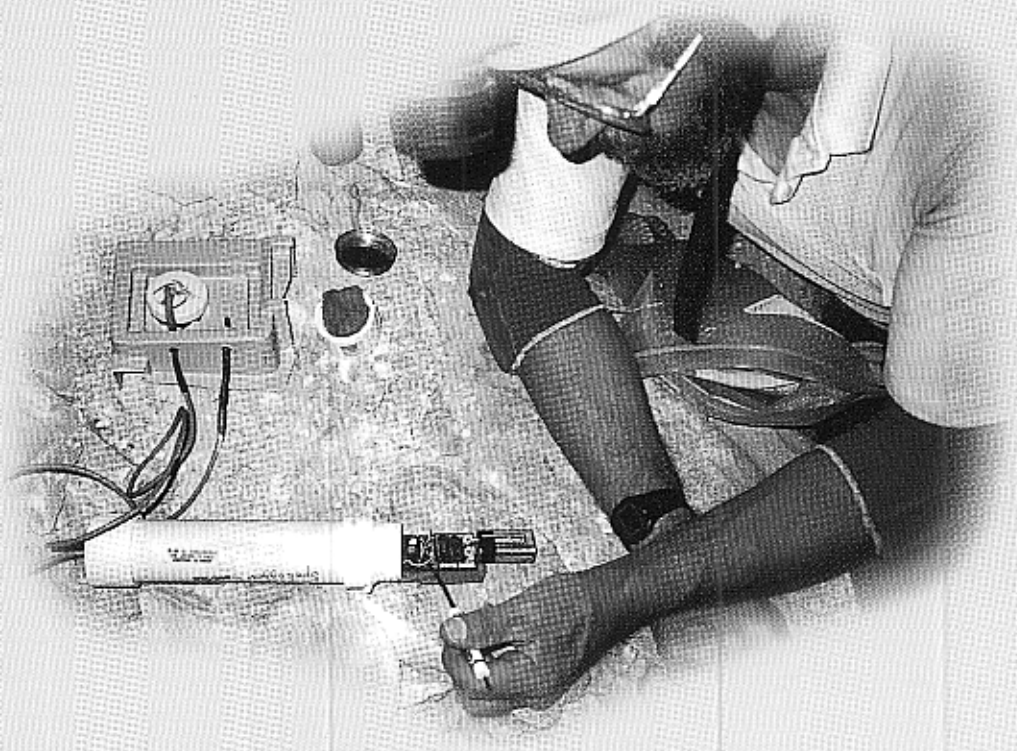


BASIC Stamp® Starter Kit
Version 1.0

PARALLAX INC.®

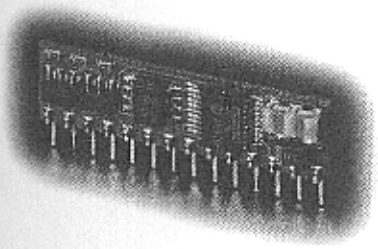
Introduction

Thank you for purchasing the BASIC Stamp Starter Kit. This package is meant to serve as an introduction to BASIC Stamp computers; it contains one BASIC Stamp, as well as the programming software and cables that you'll need to program the BASIC Stamp.

Documentation: this manual is divided into three sections: the first section describes how to connect the BASIC Stamp to your PC and how to write PBASIC programs; the second section describes the individual PBASIC instructions; and the third section contains useful application notes that show how to accomplish common tasks with BASIC Stamps.

PBASIC Language: the BASIC Stamps are programmed in a simple version of the BASIC language, called *PBASIC*. We developed PBASIC to be easy to understand, yet well-suited for many control and monitoring applications. The PBASIC language includes familiar instructions, such as GOTO, FOR...NEXT, and IF...THEN, as well as specialized instructions, such as SERIN, PWM, BUTTON, COUNT, and DTMFOUT.

Hardware: the BASIC Stamp discussed in this manual is our original BASIC Stamp version D. Version D is perfect for a starter kit, because it includes a prototyping area, 9-volt battery clips, and a connector for the programming cable.



The BS1-IC has the same capabilities as the BASIC Stamp included in this package, but in a smaller form.

As you may know, we offer two newer BASIC Stamps, called the "BS1-IC" and "BS2-IC." The BS1-IC has the same capabilities as version D, but the BS1-IC is packaged in a small 14-pin SIP module. The BS2-IC is a more powerful BASIC Stamp, packaged in a 24-pin DIP module. Both BASIC Stamp modules offer distinct advantages, but they lack the prototyping area, battery clips, and programming connectors of the version D. With the newer BASIC Stamp modules, you must purchase a separate "carrier board" to have these features.

Summary: if you find this BASIC Stamp useful and even fun, then you may later consider the BS1-IC or BS2-IC. You already have the items necessary to program the BS1-IC, since it uses the same software and cable as the version D. The BS2-IC, however, requires different programming materials, which can be purchased as an upgrade.

Contents

Chapter 1: Hardware and Programming Information

Programming 5
- System requirements 5
- Packing list 5
- Connecting to the PC 6

Hardware 7
- BASIC Stamp hardware features 7
  - I/O header signals 7
- BASIC Stamp schematic 8
- Voltage regulator current limits 8

I/O Port & Variable Space 9

Common Questions 11

Example Application 13

Using the Editor 14
- Starting the editor 14
- Program formatting 14
- Entering and editing programs 18
- Editor function keys 18
- Running your program 20
- Loading a program from disk 20
- Saving a program on disk 20
- Using cut, copy, and paste 21
- Using search and replace 22

Chapter 2: PBASIC Language

Instruction Set Summary 23
- BRANCH 25
- BUTTON 26
- DEBUG 28
- EEPROM 29
- END 30
- FOR...NEXT 31
- GOSUB 33
- GOTO 34
- HIGH 35
- IF...THEN 36
- INPUT 37
- LET 38
- LOOKDOWN 40
- LOOKUP 41

Contents

LOW 42
NAP 43
OUTPUT 45
PAUSE 46
POT 47
PULSIN 49
PULSOUT 50
PWM 51
RANDOM 53
READ 54
RETURN 55
REVERSE 56
SERIN 57
SEROUT 61
SLEEP 64
SOUND 65
TOGGLE 66
WRITE 67

Chapter 3: Application Notes

Note #1: LCD user-interface terminal 69
Note #2: Interfacing an 8-bit A/D convertor 75
Note #3: Hardware solution for keypads 79
Note #4: Controlling and testing servos 83
Note #5: Practical pulse measurements 89
Note #6: A serial stepper-motor controller 97
Note #7: Using a thermistor 101
Note #8: Sending Morse code 107
Note #9: Constructing a dice game 111
Note #10: Humidity and temperature 113
Note #11: Infrared communication 117
Note #12: Sonar rangefinding 121
Note #13: Using serial EEPROMs 127
Note #14: Networking multiple Stamps 133
Note #15: Using PWM for analog output 139
Note #16: Keeping Stamp programs private 143
Note #17: Solar-powered Stamp 147
Note #18: One pin, many switches 153
Note #19: Using the button instruction effectively 157
Note #20: An accurate timebase 165
Note #21: Fun with model trains 169
Note #22: Interfacing a 12-bit A/D convertor 181
Note #23: Interfacing the DS1620 digital thermometer 187